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(54) **LATCH WITH A BUILT-IN ADJUSTMENT MECHANISM**

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F16B 5/02 (2006.01)
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(52) **U.S. Cl.**
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USPC 403/11, 13, 43–46; 29/525.01, 525.02, 29/525.08
See application file for complete search history.

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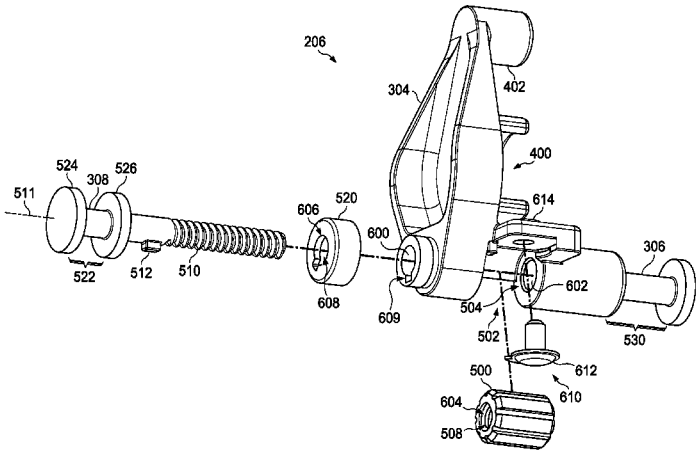
(57) **ABSTRACT**

A method and apparatus is provided for adjusting a latch. An apparatus comprises a latch body, a first member, and a second member associated with the latch body. A receiving area extends through at least a portion of the latch body. The first member is configured to be at least partially received within the receiving area of the latch body. The first member has a first coupling element. The second member has a second coupling element. Movement of the first member along an axis through the receiving area changes a distance between the first coupling element and the second coupling element.

20 Claims, 11 Drawing Sheets



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CPC *Y10T29/49963* (2015.01); *Y10T 403/16* (2015.01); *Y10T 403/1616* (2015.01)

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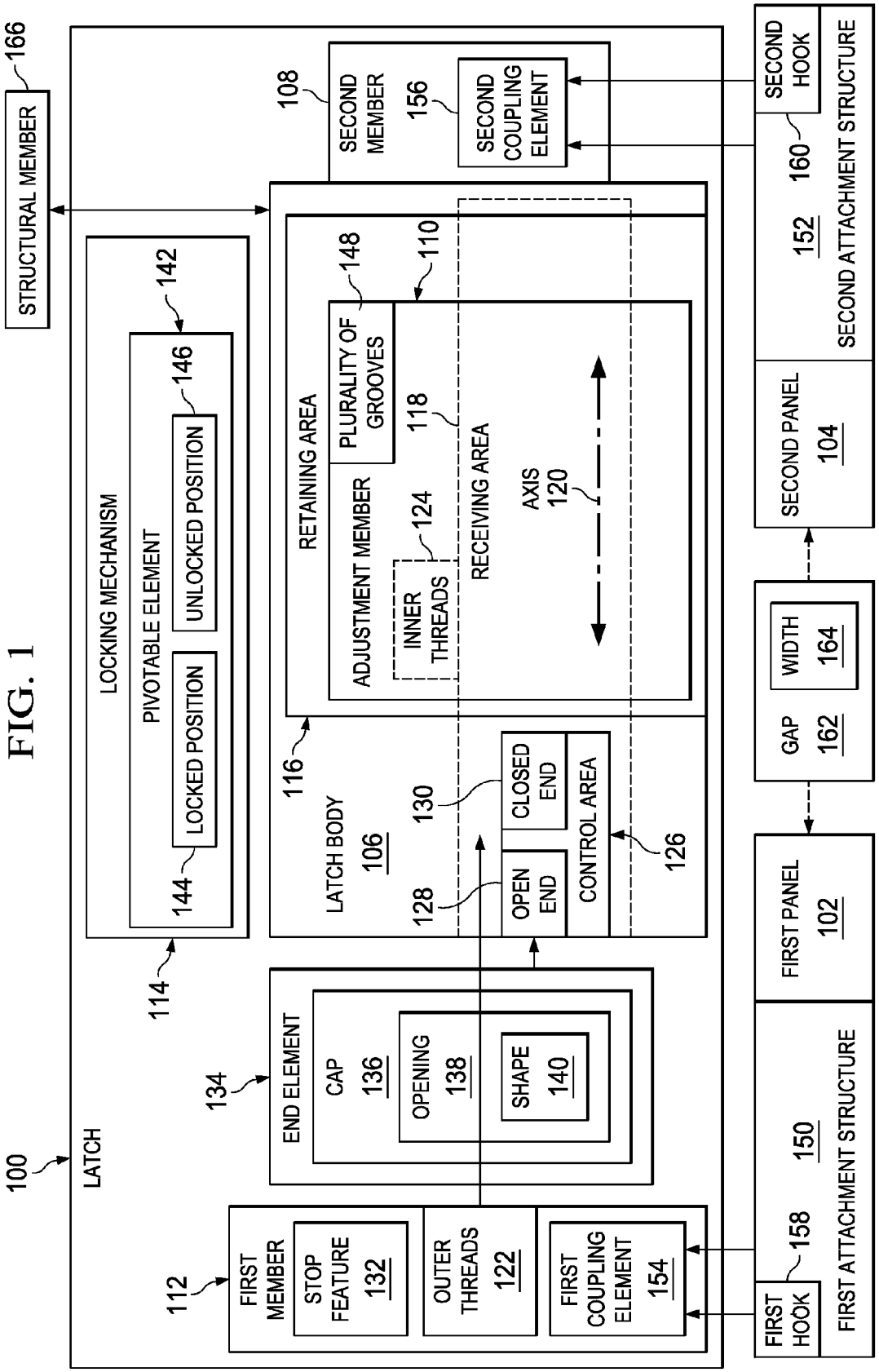
FIG. 1


100
LATCH
166
STRUCTURAL MEMBER
108
SECOND MEMBER
156
SECOND COUPLING ELEMENT
SECOND HOOK
160
152
SECOND ATTACHMENT STRUCTURE
SECOND PANEL
104
LOCKING MECHANISM
142
PIVOTABLE ELEMENT
146
UNLOCKED POSITION
LOCKED POSITION
144
114
RETAINING AREA
148
PLURALITY OF GROOVES
110
ADJUSTMENT MEMBER
118
INNER THREADS
124
RECEIVING AREA
AXIS
120
116
LATCH BODY
106
130
CLOSED END
128
OPEN END
CONTROL AREA
126
GAP
162
WIDTH
164
FIRST PANEL
102
134
END ELEMENT
CAP
136
OPENING
138
SHAPE
140
112
FIRST MEMBER
STOP FEATURE
132
OUTER THREADS
122
FIRST COUPLING ELEMENT
154
FIRST HOOK
158
150
FIRST ATTACHMENT STRUCTURE

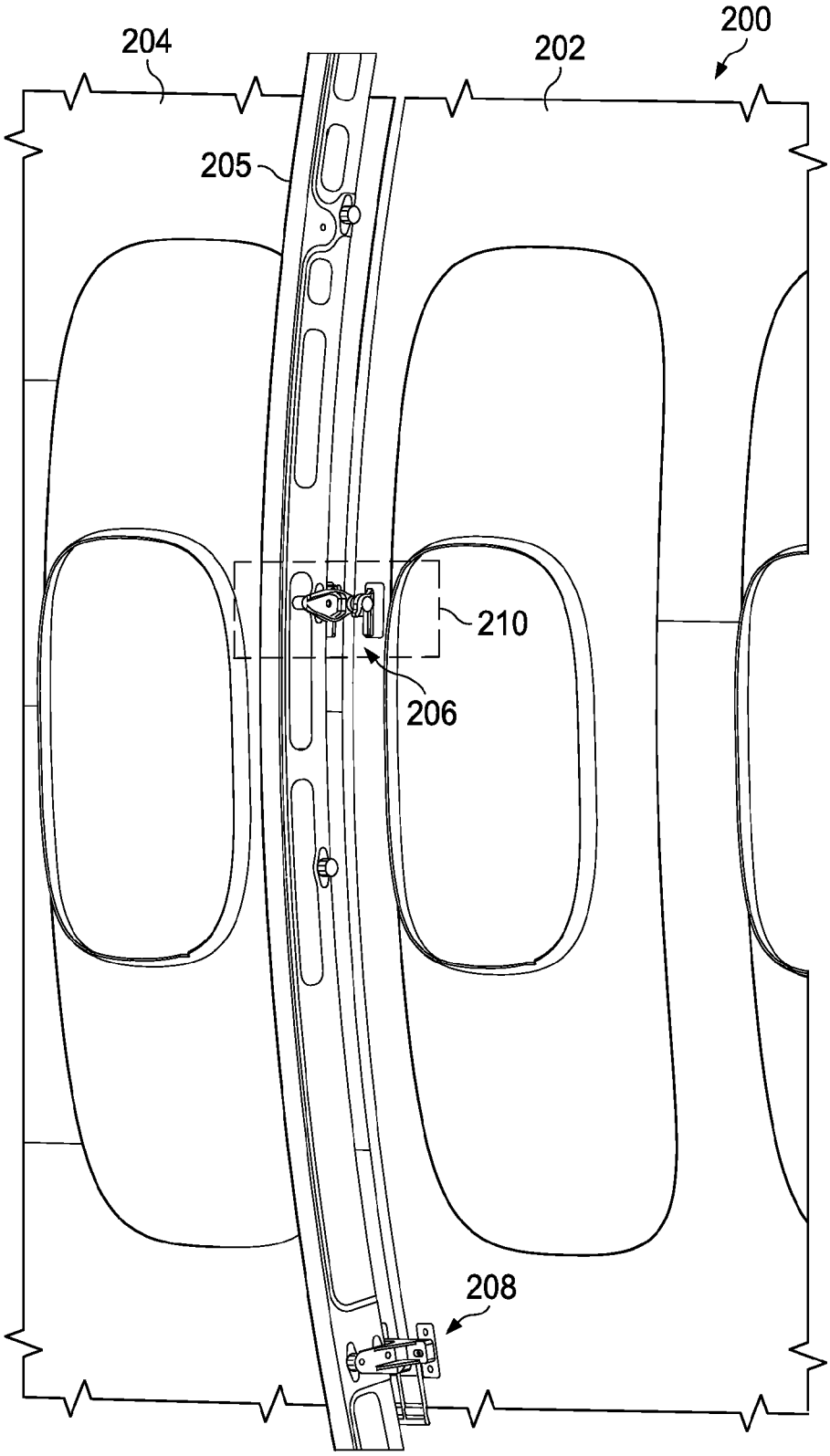


FIG. 2

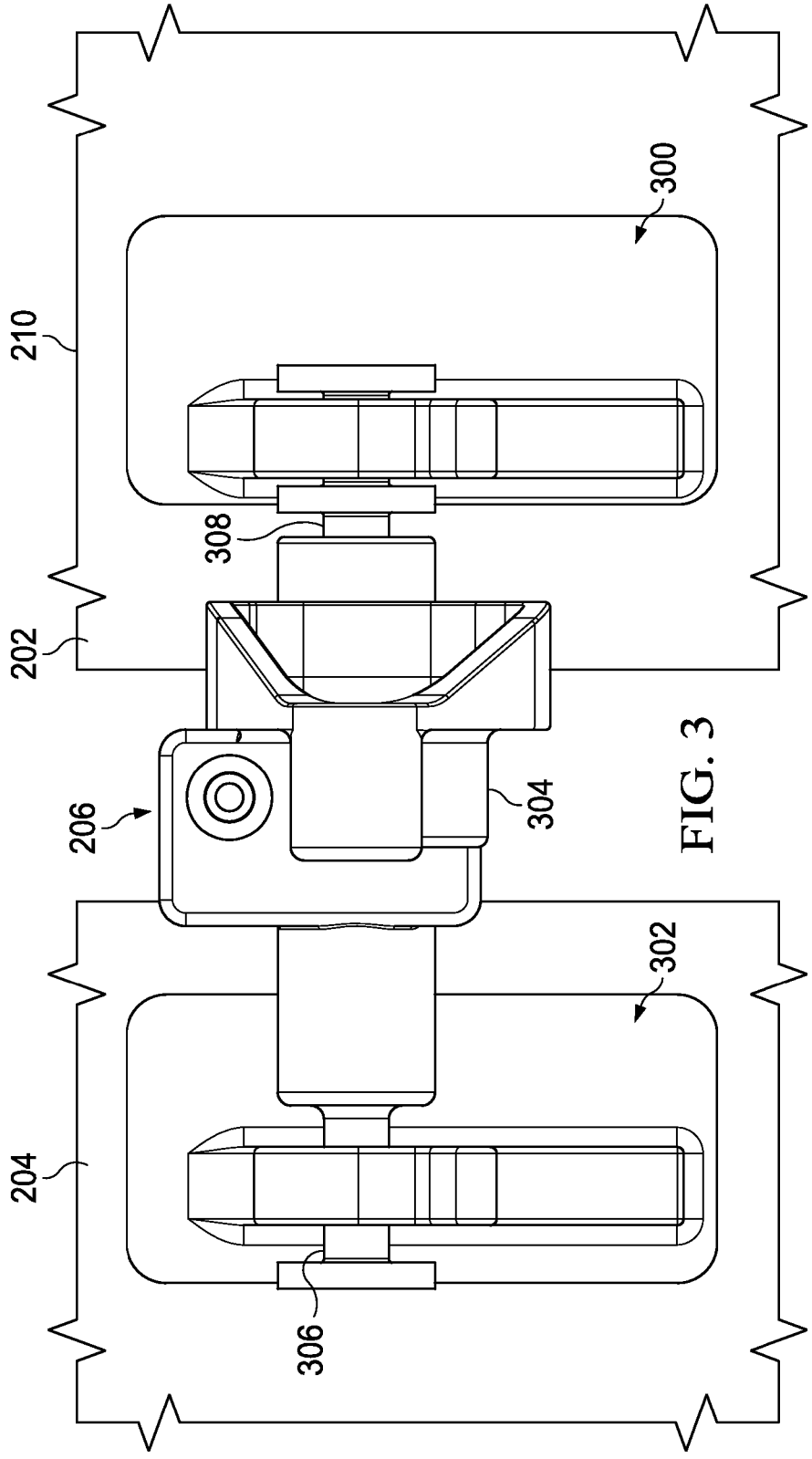


FIG. 3

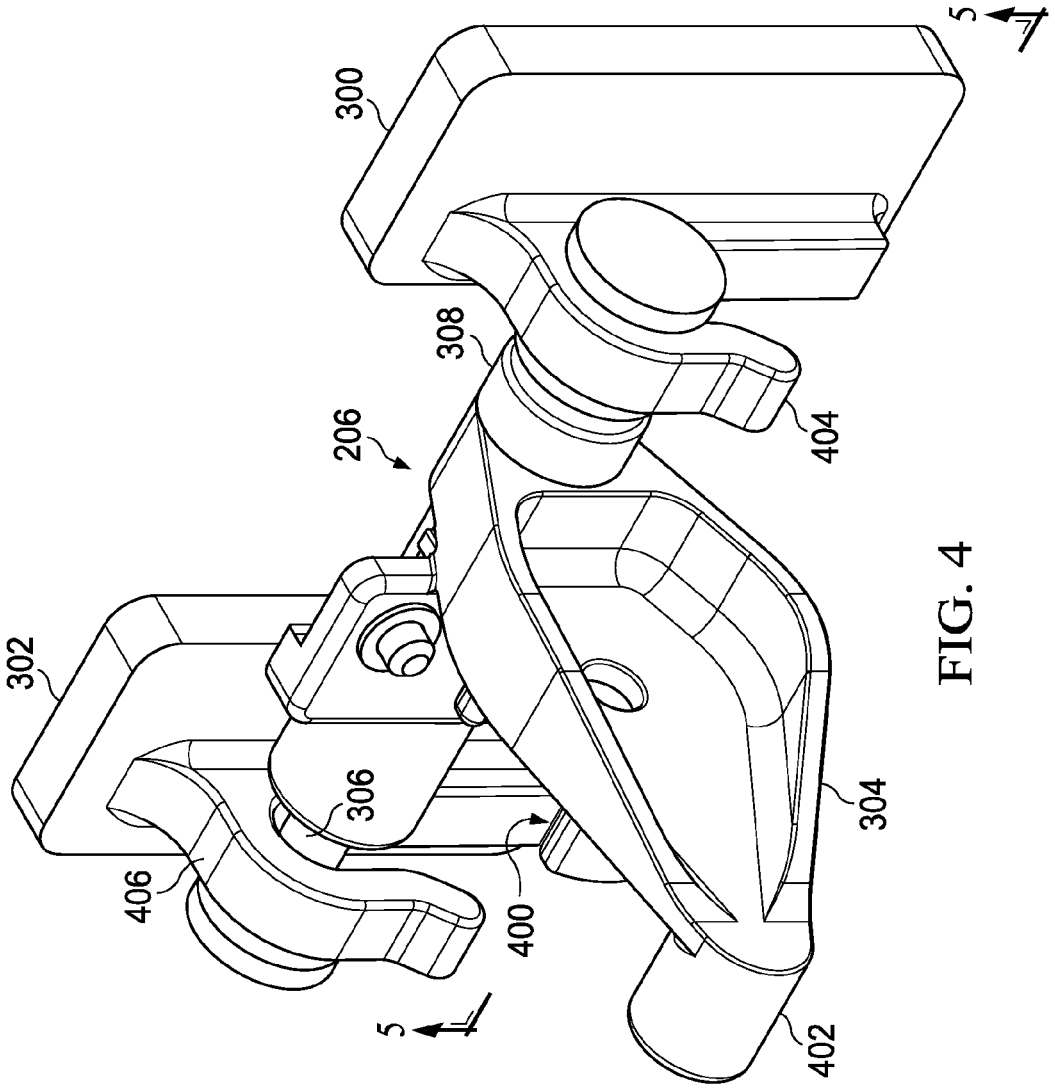


FIG. 4

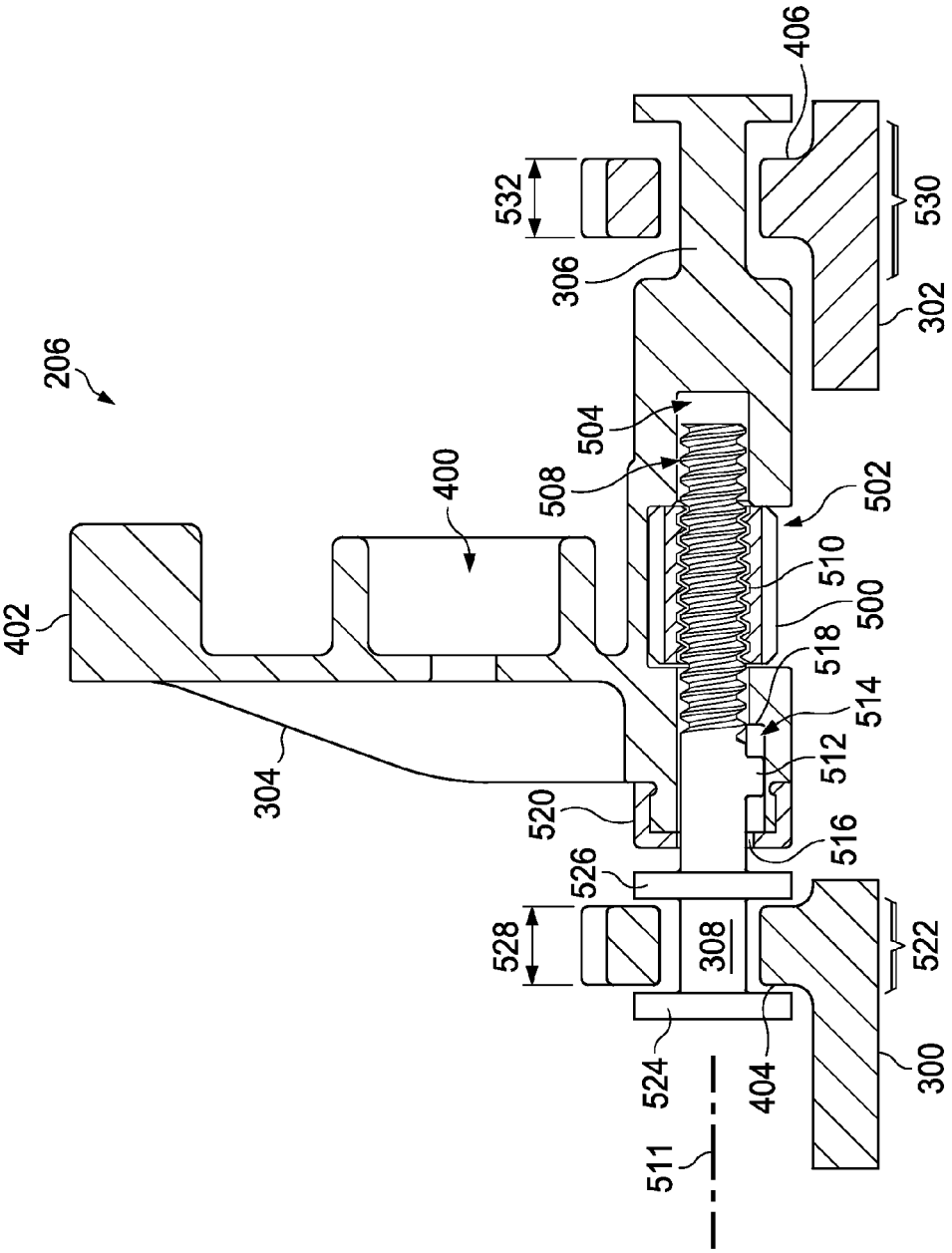
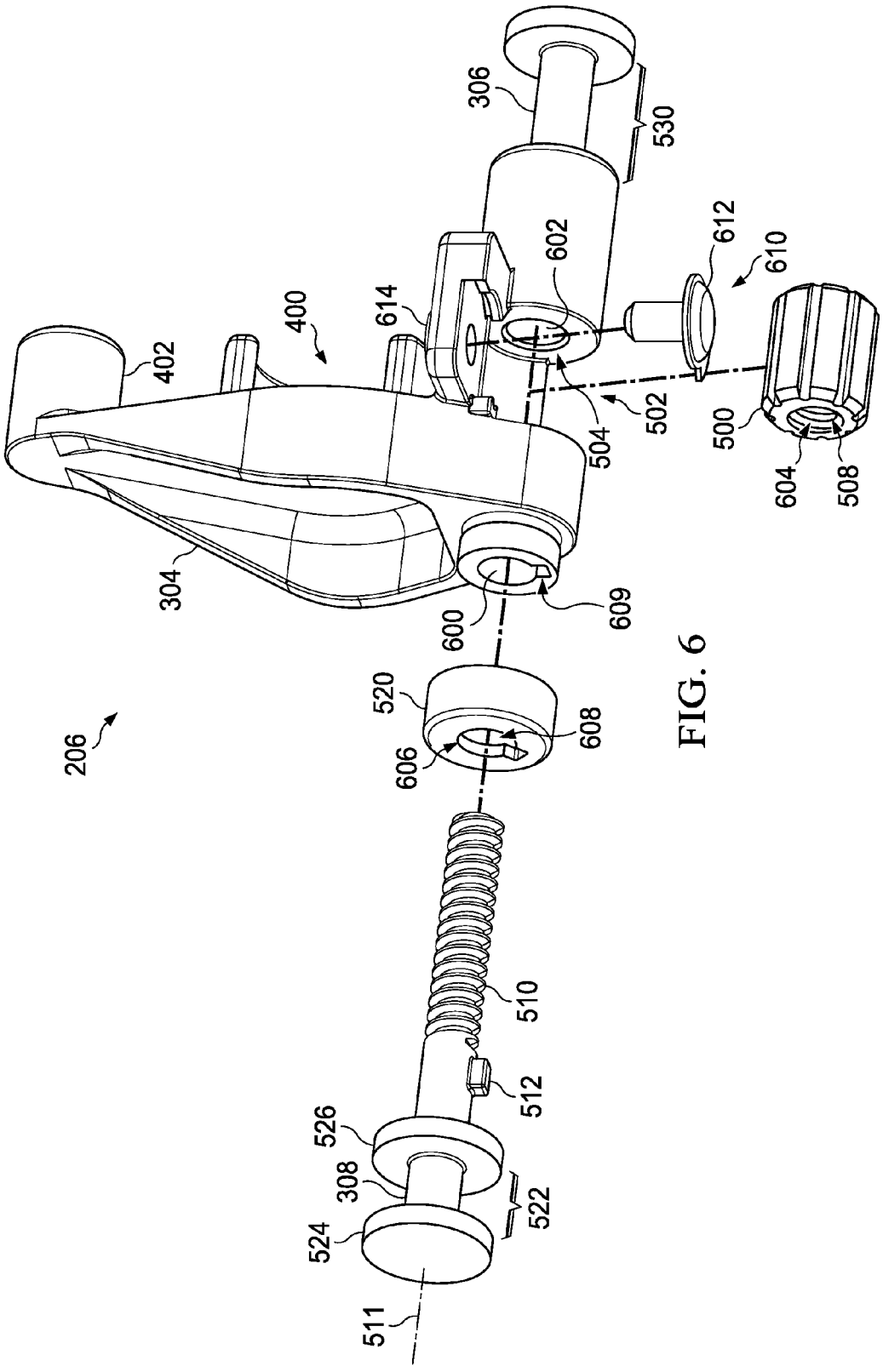

206
402
400
304
406
532
306
530
302
504
508
502
510
500
518
514
512
520
516
526
528
308
522
524
404
300
511

FIG. 5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612
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602
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400
402
502
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512
526
308
522
524
511

FIG. 6

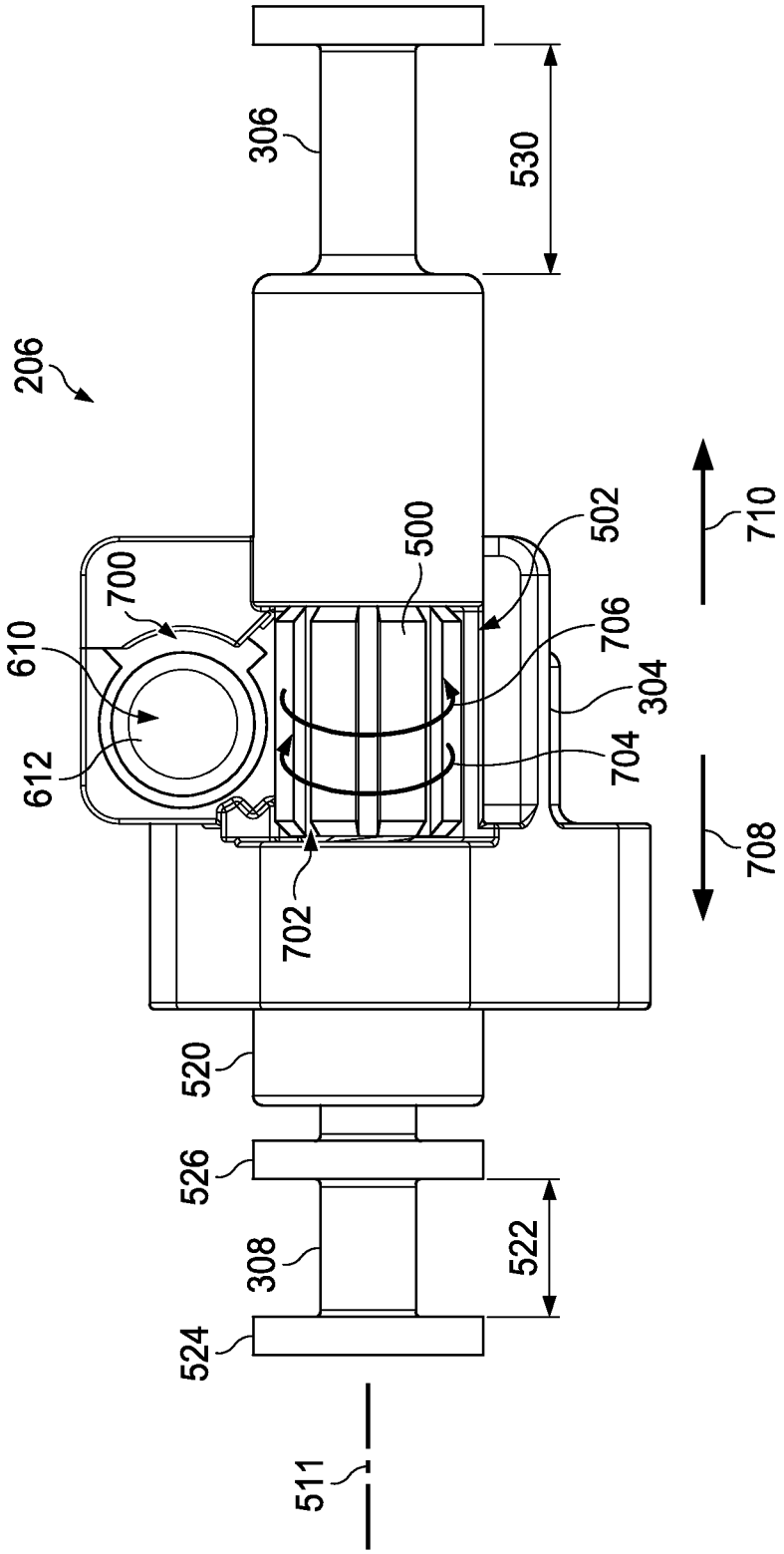

306
530
206
500
502
710
700
610
706
304
612
704
708
702
520
526
308
522
524
511

FIG. 7

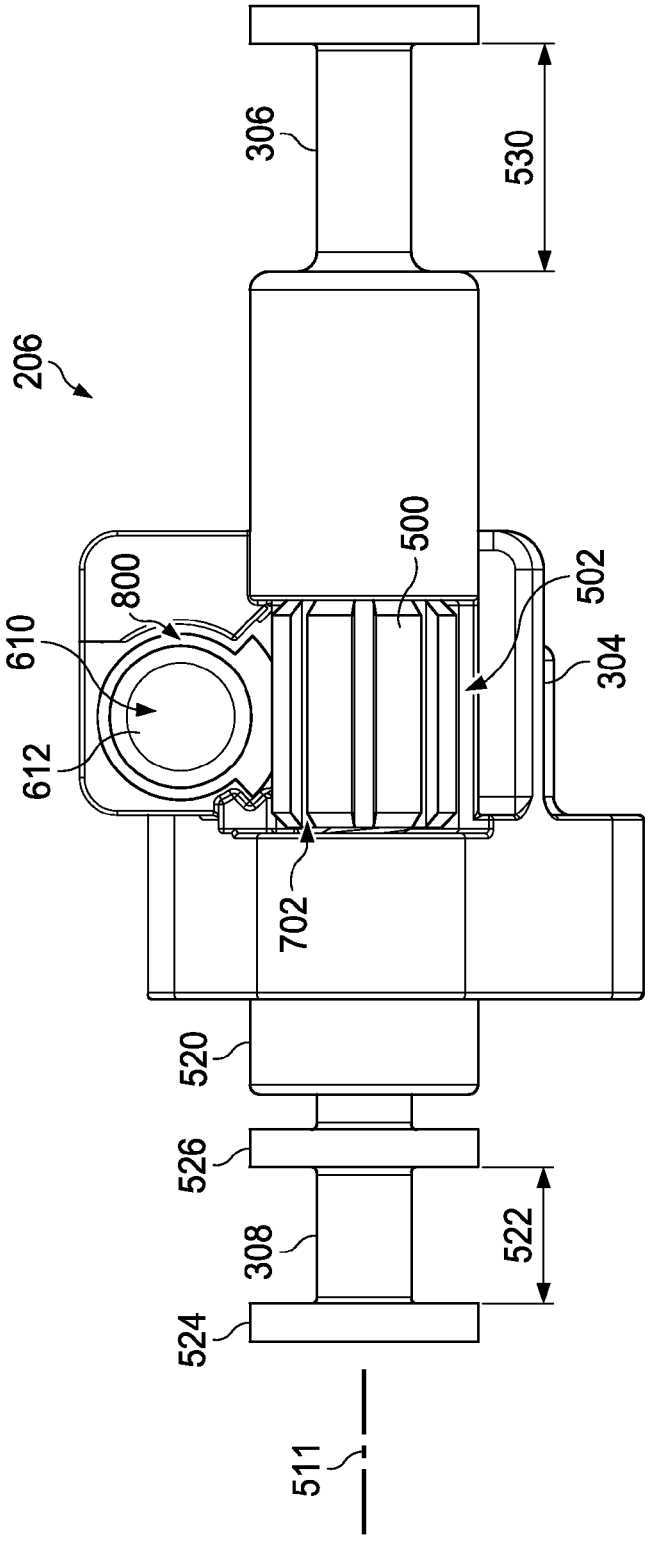


FIG. 8

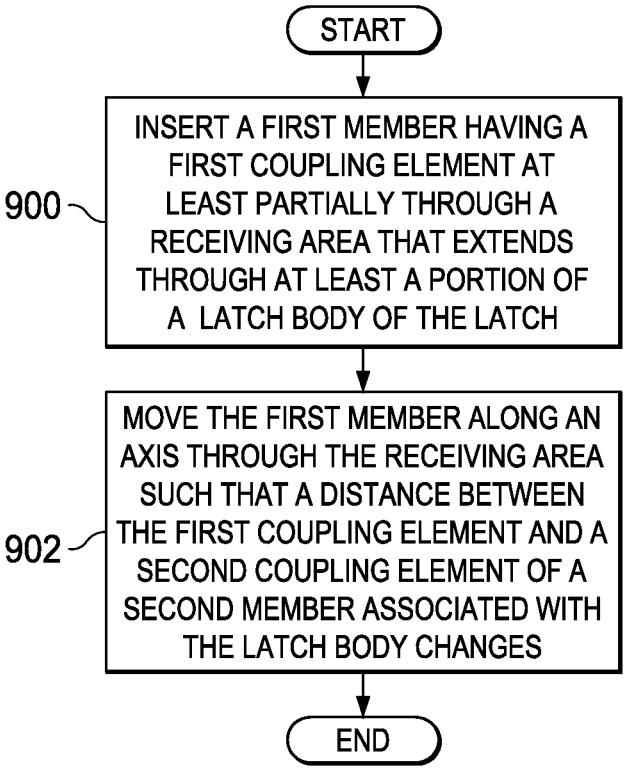

START
INSERT A FIRST MEMBER HAVING A FIRST COUPLING ELEMENT AT LEAST PARTIALLY THROUGH A RECEIVING AREA THAT EXTENDS THROUGH AT LEAST A PORTION OF A LATCH BODY OF THE LATCH
900
MOVE THE FIRST MEMBER ALONG AN AXIS THROUGH THE RECEIVING AREA SUCH THAT A DISTANCE BETWEEN THE FIRST COUPLING ELEMENT AND A SECOND COUPLING ELEMENT OF A SECOND MEMBER ASSOCIATED WITH THE LATCH BODY CHANGES
902
END

FIG. 9

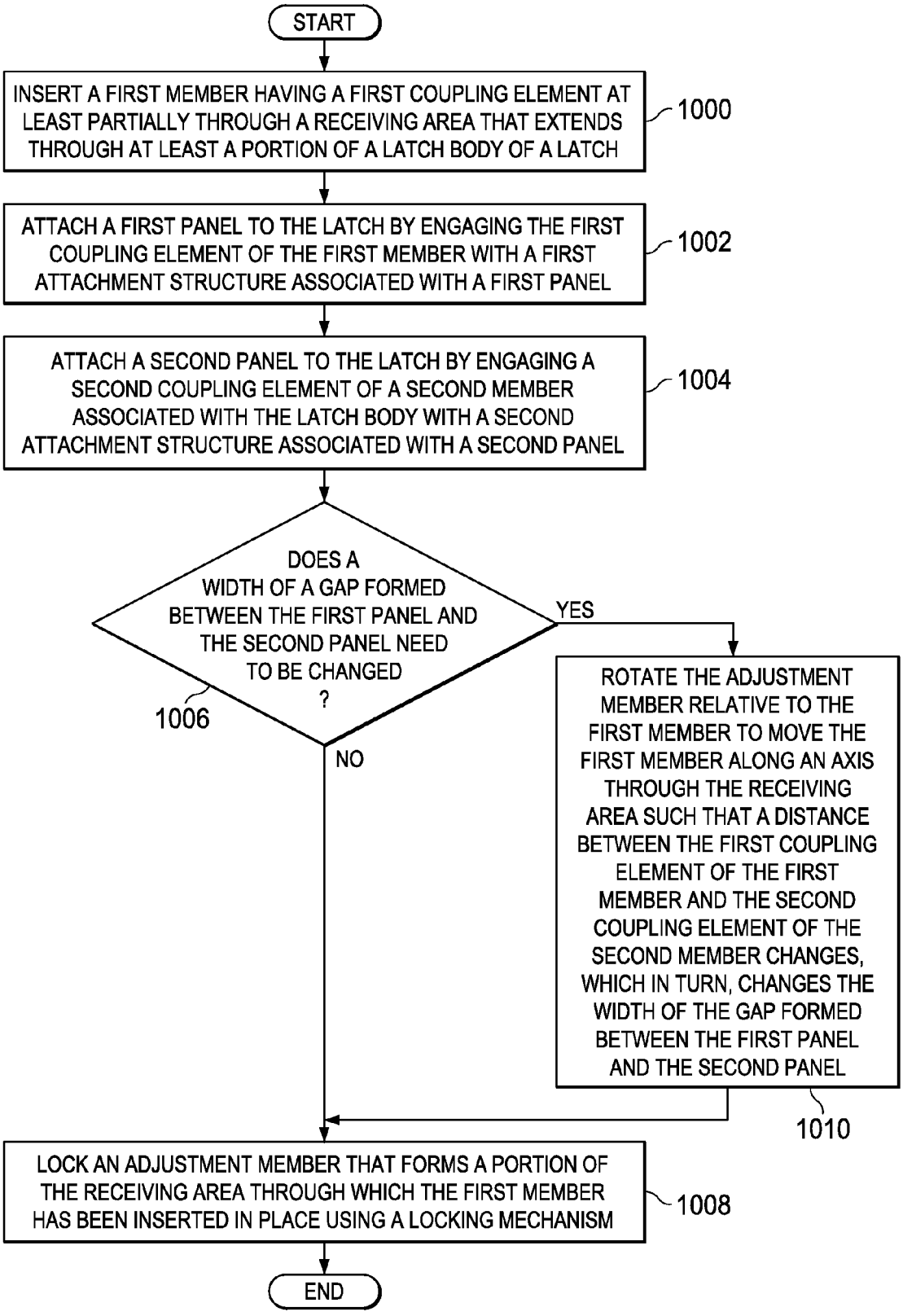

START
INSERT A FIRST MEMBER HAVING A FIRST COUPLING ELEMENT AT LEAST PARTIALLY THROUGH A RECEIVING AREA THAT EXTENDS THROUGH AT LEAST A PORTION OF A LATCH BODY OF A LATCH
1000
ATTACH A FIRST PANEL TO THE LATCH BY ENGAGING THE FIRST COUPLING ELEMENT OF THE FIRST MEMBER WITH A FIRST ATTACHMENT STRUCTURE ASSOCIATED WITH A FIRST PANEL
1002
ATTACH A SECOND PANEL TO THE LATCH BY ENGAGING A SECOND COUPLING ELEMENT OF A SECOND MEMBER ASSOCIATED WITH THE LATCH BODY WITH A SECOND ATTACHMENT STRUCTURE ASSOCIATED WITH A SECOND PANEL
1004
DOES A WIDTH OF A GAP FORMED BETWEEN THE FIRST PANEL AND THE SECOND PANEL NEED TO BE CHANGED ?
1006
YES
NO
ROTATE THE ADJUSTMENT MEMBER RELATIVE TO THE FIRST MEMBER TO MOVE THE FIRST MEMBER ALONG AN AXIS THROUGH THE RECEIVING AREA SUCH THAT A DISTANCE BETWEEN THE FIRST COUPLING ELEMENT OF THE FIRST MEMBER AND THE SECOND COUPLING ELEMENT OF THE SECOND MEMBER CHANGES, WHICH IN TURN, CHANGES THE WIDTH OF THE GAP FORMED BETWEEN THE FIRST PANEL AND THE SECOND PANEL
1010
LOCK AN ADJUSTMENT MEMBER THAT FORMS A PORTION OF THE RECEIVING AREA THROUGH WHICH THE FIRST MEMBER HAS BEEN INSERTED IN PLACE USING A LOCKING MECHANISM
1008
END

FIG. 10

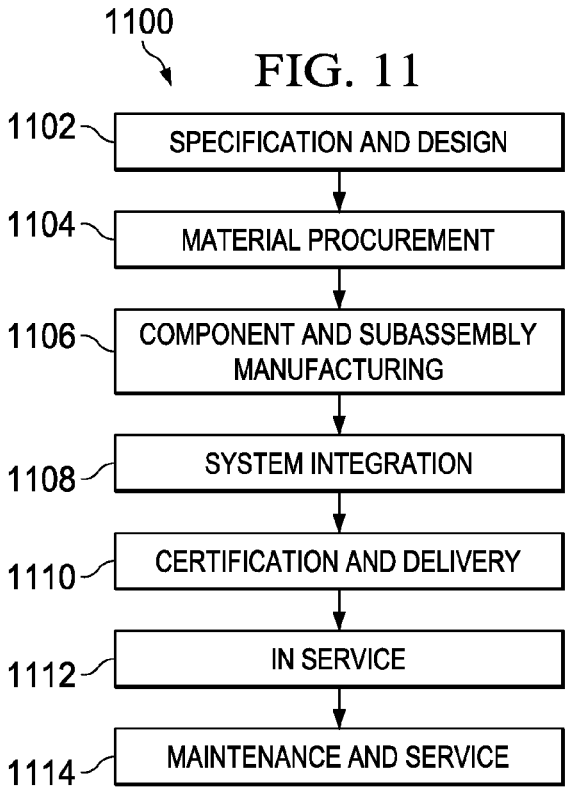
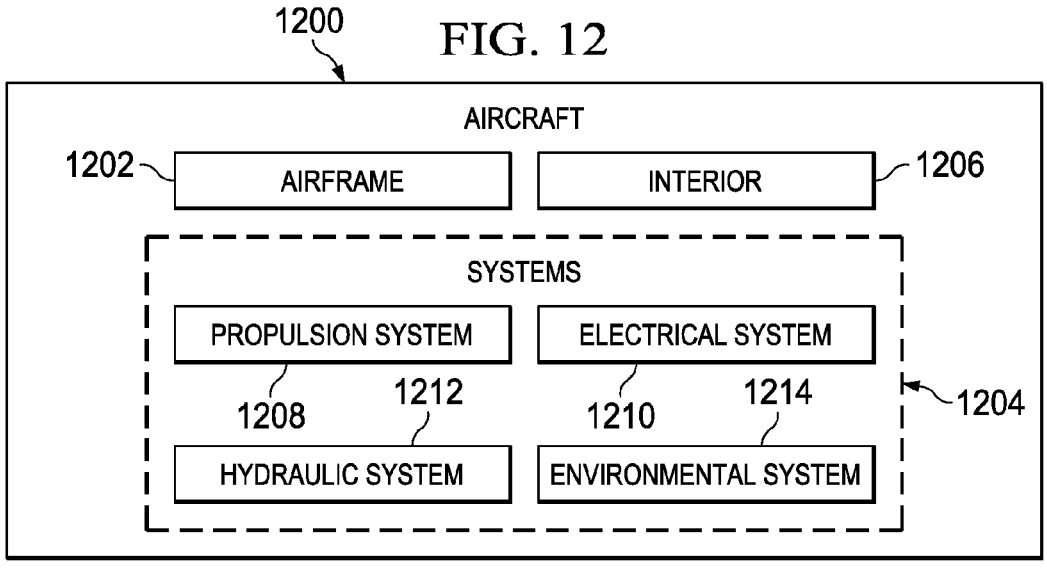

1100
1102
SPECIFICATION AND DESIGN
1104
MATERIAL PROCUREMENT
1106
COMPONENT AND SUBASSEMBLY MANUFACTURING
1108
SYSTEM INTEGRATION
1110
CERTIFICATION AND DELIVERY
1112
IN SERVICE
1114
MAINTENANCE AND SERVICE

FIG. 11


1200
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1202
AIRFRAME
INTERIOR
1206
SYSTEMS
PROPULSION SYSTEM
ELECTRICAL SYSTEM
1208
1212
1210
1214
1204
HYDRAULIC SYSTEM
ENVIRONMENTAL SYSTEM

FIG. 12

LATCH WITH A BUILT-IN ADJUSTMENT MECHANISM

BACKGROUND INFORMATION

1. Field

The present disclosure relates generally to a latch and, in particular, to a latch for joining panels without using any additional tools. Still more particularly, the present disclosure relates to a latch that allows two panels to be joined and the width of the gap formed between the two panels to be adjusted.

2. Background

Typically, the sidewalls of an aircraft interior are formed by installing panels that are joined together using mechanical fasteners. These panels may be referred to as, for example, "wall panels" or "sidewall panels." With some currently available techniques for joining panels, a bracket having multiple slots is used to join two panels together. Each of these slots has an elongate shape such as, for example, an oval shape. A nut plate is located within each of these slots and is allowed to move freely within the corresponding slot of the bracket. Each of the nut plates is configured to receive the threaded end of a screw.

These screws are used to fasten the panels to the bracket. In particular, each panel may have an attachment feature, such as, for example, without limitation, a loop, configured to receive the threaded end of a screw. When the bracket and the nut plates located in the slots of the bracket are positioned relative to the panels, screws are driven through the loops and into the nut plates to fasten the panels to the bracket. In this manner, the two panels are joined together by the bracket.

However, joining panels using these types of brackets, nut plates, and screws may take more time and/or effort than desired. Additionally, tools may be needed to drive the screws into the nut plates. For example, screwdrivers, screw guns, and/or other types of tools may be needed.

Further, with these types of currently available techniques, the panels may be joined outside of selected tolerances. In particular, the width of the gap formed between the panels after the panels are joined together may be greater than desired. Consequently, the installation of these panels may need to be reworked multiple times to achieve an installation of panels that are within selected tolerances. This reworking may take more time and/or effort than desired. Further, the reworking may be more expensive than desired. Therefore, it would be desirable to have a method and apparatus that take into account at least some of the issues discussed above, as well as other possible issues.

SUMMARY

In one illustrative embodiment, an apparatus comprises a latch body, a first member, and a second member associated with the latch body. A receiving area extends through at least a portion of the latch body. The first member is configured to be at least partially received within the receiving area of the latch body. The first member has a first coupling element. The second member has a second coupling element. Movement of the first member along an axis through the receiving area changes a distance between the first coupling element and the second coupling element.

In another illustrative embodiment, a method for adjusting a latch is provided. A first member having a first coupling element is inserted at least partially through a receiving area that extends through at least a portion of a latch body of the latch. The first member moves along an axis through the receiving area such that a distance between the first coupling element and a second coupling element of a second member associated with the latch body changes.

The features and functions can be achieved independently in various embodiments of the present disclosure or may be combined in yet other embodiments in which further details can be seen with reference to the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the illustrative embodiments are set forth in the appended claims. The illustrative embodiments, however, as well as a preferred mode of use, further objectives and features thereof, will best be understood by reference to the following detailed description of an illustrative embodiment of the present disclosure when read in conjunction with the accompanying drawings, wherein:

FIG. **1** is an illustration of a latch in the form of a block diagram in accordance with an illustrative embodiment;

FIG. **2** is an illustration of a portion of a sidewall for an interior of an aircraft in accordance with an illustrative embodiment;

FIG. **3** is an illustration of an enlarged view of a portion of a sidewall with a latch in accordance with an illustrative embodiment;

FIG. **4** is an illustration of an isometric view of a latch in accordance with an illustrative embodiment;

FIG. **5** is an illustration of a top cross-sectional view of a latch in accordance with an illustrative embodiment;

FIG. **6** is an illustration of an exploded isometric view of a latch in accordance with an illustrative embodiment;

FIG. **7** is an illustration of a latch having a locking mechanism in an unlocked position in accordance with an illustrative embodiment;

FIG. **8** is an illustration of a latch having a locking mechanism in a locked position in accordance with an illustrative embodiment;

FIG. **9** is an illustration of a process for adjusting a latch in the form of a flowchart in accordance with an illustrative embodiment;

FIG. **10** is an illustration of a process for attaching panels to each other using a latch in the form of a flowchart in accordance with an illustrative embodiment;

FIG. **11** is an illustration of an aircraft manufacturing and service method in the form of a flowchart in accordance with an illustrative embodiment; and

FIG. **12** is an illustration of an aircraft in the form of a block diagram in accordance with an illustrative embodiment.

DETAILED DESCRIPTION

The illustrative embodiments recognize and take into account different considerations. For example, the illustrative embodiments recognize and take into account that a latch that is capable of joining together wall panels without requiring any additional tools may reduce the time and/or effort needed to join and install these wall panels. Further, the illustrative embodiments recognize and take into account that it may be desirable to have a latch that allows the width of the gap formed between joined wall panels to be adjusted without requiring that the wall panels be disengaged and rejoined one or more times.

Thus, the illustrative embodiments provide a method and apparatus for joining panels using a latch that has a built-in adjustment mechanism. Further, the illustrative embodiments

provide a latch that does not require any additional tools to lock fasteners received in the latch in fixed positions.

With reference now to FIG. **1**, an illustration of a latch in the form of a block diagram is depicted in accordance with an illustrative embodiment. In FIG. **1**, latch **100** may be used to join first panel **102** and second panel **104**. First panel **102** and second panel **104** may be, for example, without limitation, sidewall panels for the interior of an aircraft.

In this illustrative example, latch **100** includes latch body **106**, first member **112**, second member **108**, adjustment member **110**, and locking mechanism **114**. As depicted, second member **108** may be associated with latch body **106**. Further, second member **108** may or may not be moveable relative to latch body **106**, depending on the implementation.

When one component is "associated" with another component, the association is a physical association in the depicted examples. For example, a first component, such as second member **108** may be considered to be associated with a second component, such as latch body **106**, by being secured to the second component, bonded to the second component, mounted to the second component, welded to the second component, fastened to the second component, and/or connected to the second component in some other suitable manner.

The first component also may be connected to the second component using a third component. In some cases, the first component may be considered to be associated with the second component by being formed as part of and/or an extension of the second component. In other words, the first component may be an integral part of the second component. In some cases, the second component may be considered an integral part of the first component.

In this illustrative example, receiving area **118** may extend through at least a portion of latch body **106**. In one illustrative example, receiving area **118** may be a hole within latch body **106** having one open end and one closed end. In another example, receiving area **118** may be partially formed by a channel that extends through latch body **106**. This channel may be open at both ends.

At least a portion of receiving area **118** may be formed by adjustment member **110**. In one illustrative example, adjustment member **110** may be positioned relative to latch body **106**. In particular, adjustment member **110** may be held within retaining area **116** formed by latch body **106**. Retaining area **116** may be an open space or cavity formed by latch body **106** having a size and/or shape configured to receive adjustment member **110**. Adjustment member **110** may take a number of different forms. In one illustrative example, adjustment member **110** may be a separate component from latch body **106**. For example, adjustment member **110** may take the form of a cam.

Of course, in other illustrative examples, adjustment member **110** may be formed by a portion of latch body **106**. In other words, adjustment member **110** may be part of latch body **106**. For example, adjustment member **110** may be the portion of latch body **106** that defines the hole through latch body **106** that forms receiving area **118**.

When adjustment member **110** is positioned within retaining area **116**, receiving area **118** may be formed. Receiving area **118** may extend through latch body **106** and adjustment member **110**. In particular, latch body **106** may have one or more openings or holes that form a portion of receiving area **118**. Further, adjustment member **110** may have a hole that forms a portion of receiving area **118**.

When adjustment member **110** is separate from latch body **106** and when the hole in adjustment member **112** is open at both ends, receiving area **118** may be referred to as a channel that extends through latch body **106** and adjustment member **112**. Although a channel is described as having two open ends in these illustrative examples, a channel may have one open end and one closed end, depending on the implementation.

Receiving area **118** is configured to at least partially receive first member **112**. For example, first member **112** may be at least partially inserted within receiving area **118** such that first member **112** is retained by receiving area **118**.

Axis **120** may extend through receiving area **118**. In one illustrative example, axis **120** may be a center longitudinal axis through receiving area **118**. In this illustrative example, first member **112** may be moved in a direction along axis **120** through receiving area **118**. In particular, relative rotation between adjustment member **110** and first member **112** may cause first member **112** to move along axis **120**. Relative rotation between adjustment member **110** and first member **112** may be rotation of one relative to the other. In this manner, relative rotation between adjustment member **110** and first member **112** may include rotation of adjustment member **110** and/or rotation of first member **112**.

In one illustrative example, adjustment member **110** may be rotated about axis **120** to cause first member **112** to move along axis **120**. For example, at least a portion of first member **112** may have outer threads **122**. More specifically, outer threads **122** may be located on the outer surface of a portion of first member **112**. Further, adjustment member **110** may have inner threads **124**. Inner threads **124** may define the hole through adjustment member **110** that forms a portion of receiving area **118**. Outer threads **122** of first member **112** may be configured to engage inner threads **124** of adjustment member **110** in a manner that causes first member **112** to move in a direction along axis **120** when adjustment member **110** is rotated about axis **120**.

Further, first member **112** may have first coupling element **154** and second member **108** may have second coupling element **156**. Movement of first member **112** along axis **120** may change a distance between first coupling element **154** and second coupling element **156**. In one illustrative example, first coupling element **154** may take the form of a first elongated portion of first member **112** and second coupling element **156** may take the form of a second elongated portion of second member **108**. Movement of first member **112** in one direction along axis **120** may lengthen the distance between first coupling element **154** and second coupling element **156**, while movement of first member **112** in the other direction along axis **120** may shorten the distance between first coupling element **154** and second coupling element **156**.

As depicted, control area **126** may be present in association with receiving area **118**. In one illustrative example, control area **126** may be considered part of receiving area **118**. However, in some illustrative examples, control area **126** may be considered an additional hole, opening, or channel that runs substantially parallel to receiving area **118** and opens to receiving area **118**. In this illustrative example, control area **126** has open end **128** and closed end **130**. Closed end **130** may be formed by some structural portion of latch body **106**. Open end **128** may be configured to receive stop feature **132** associated with first member **112**.

Stop feature **132** may be associated with outer threads **122** of first member **112** in one illustrative example. Stop feature **132** may take the form of, for example, without limitation, a protrusion at some point along outer threads **122**. First member **112** may be inserted into receiving area **118** in such a manner that stop feature **132** enters control area **126**.

In this illustrative example, end element **134** may be associated with latch body **106**. End element **134** may take the form of, for example, without limitation, cap **136**. Cap **136**

may be attached to latch body **106** at the entrance into receiving area **118**. Cap **136** may have opening **138** that leads into receiving area **118**. First member **112** may be inserted through opening **138** into receiving area **118**.

As depicted, opening **138** may have shape **140** selected to receive first member **112** and stop feature **132**. Shape **140** may be selected such that only one position for cap **136** relative to axis **120** may allow both first member **112** and stop feature **132** to pass through opening **138** and into receiving area **118**. In one illustrative example, shape **140** may be a shape that substantially matches the cross-sectional shape of receiving area **118** and control area **126** for the cross-section taken perpendicular to axis **120**.

In this illustrative example, cap **136** may be rotated about axis **120** until shape **140** aligns with receiving area **118** and control area **126**. When proper alignment is not achieved, opening **138** may not open to open end **128** of control area **126**. However, when proper alignment is achieved, opening **138** may open to open end **128** of control area **126**.

When cap **136** is positioned such that shape **140** aligns with receiving area **118** and control area **126**, first member **112** may be inserted through opening **138** into receiving area **118** and stop feature **132** may pass through opening **138** into control area **126**. After stop feature **132** has fully entered control area **126**, cap **136** may then be rotated about axis **120** to close open end **128** of control area **126**.

In this manner, the movement of stop feature **132** may be limited by the first boundary formed by cap **136** at open end **128** and the second boundary formed by closed end **130** of control area **126**. In particular, adjustment member **110** may be rotated about axis **120** to move first member **112** along axis **120**. However, the distance by which first member **112** can be moved along axis **120** may be limited by the length of control area **126**.

Once first member **112** has been moved to a certain position along axis **120**, adjustment member **110** may be locked in place using locking mechanism **114**. Locking mechanism **114** is configured to prevent relative rotation between adjustment member **110** and first member **112**. In this manner, movement of first member **112** along axis **120** may be prevented.

In this illustrative example, locking mechanism **114** includes pivotable element **142**. Pivotable element **142** may be configured to pivot between locked position **144** and unlocked position **146**.

When pivotable element **142** is moved to unlocked position **146**, adjustment member **110** may be allowed to rotate about axis **120**. However, when pivotable element **142** is moved to locked position **144**, adjustment member **110** may be prevented from rotating about axis **120**. In this illustrative example, adjustment member **110** may have plurality of grooves **148** along the outer surface of adjustment member **110**. When pivotable element **142** is moved into locked position **144**, a portion of pivotable element **142** may enter, or interface with, one of plurality of grooves **148**. This interfacing may prevent adjustment member **110** from rotating.

As depicted, latch **100** may be attached to first panel **102** using first attachment structure **150** and to second panel **104** using second attachment structure **152**. First attachment structure **150** may be associated with first panel **102**, while second attachment structure **152** may be associated with second panel **104**.

For example, first attachment structure **150** may engage first coupling element **154** of first member **112** and second attachment structure **152** may engage second coupling element **156** of second member **108**. In one illustrative example, first attachment structure **150** may have first hook **158** that engages first coupling element **154** of first member **112**. In this example, second attachment structure **152** may have second hook **160** that engages second coupling element **156** of second member **108**.

In this manner, latch **100** may be attached to both first panel **102** and second panel **104** to join first panel **102** to second panel **104**. However, gap **162** may be present between first panel **102** and second panel **104**. Adjustment member **110** may be used to adjust width **164** of gap **162** formed between first panel **102** and second panel **104**. Adjustment member **110** may form a "built-in" adjustment mechanism for latch **100**.

In particular, by rotating adjustment member **110** about axis **120**, first member **112** may be moved along axis **120**. Moving first member **112** along axis **120** may move first panel **102** attached to latch **100** by first member **112**. Moving first panel **102** may, in turn, change width **164** of gap **162**.

In this illustrative example, latch **100** may be attached to structural member **166** through latch body **106**. In this manner, latch **100** may be used to attach first panel **102** and second panel **104** to structural member **166**. First panel **102** and second panel **104** may be attached to structural member **166** using latch **100** for the purpose of forming a sidewall for the interior of an aircraft.

The illustration of latch **100** in FIG. **1** is not meant to imply physical or architectural limitations to the manner in which an illustrative embodiment may be implemented. Other components in addition to or in place of the ones illustrated may be used. Some components may be unnecessary. Also, the blocks are presented to illustrate some functional components. One or more of these blocks may be combined, divided, or combined and divided into different blocks when implemented in an illustrative embodiment.

In other illustrative example, second member **108** may be optional. Instead, a second first member may be associated with latch body **106** in the place of second member **108** and configured for attachment to second panel **104**. This second first member may be moved in a direction along axis **120** using a second adjustment member similar to adjustment member **110**. In this manner, both first panel **102** attached to latch **100** through first member **112** and second panel **104** attached to latch **100** through this second first member may be moved to adjust width **164** of gap **162**.

Turning now to FIG. **2**, an illustration of a portion of a sidewall for an interior of an aircraft is depicted in accordance with an illustrative embodiment. As depicted in FIG. **2**, a portion of sidewall **200** for an interior of an aircraft is depicted. This portion of sidewall **200** is formed by first panel **202** and second panel **204**. First panel **202** and second panel **204** are examples of implementations for first panel **102** and second panel **104**, respectively, in FIG. **1**.

As depicted, first panel **202** and second panel **204** are joined using latch **206** and latch **208**. Further, latch **206** and latch **208** attach to structural member **205**. In this manner, first panel **202** and second panel **204** may be attached to structural member **205** using latch **206** and latch **208**. Structural member **205** may be an example of one implementation for structural member **166** in FIG. **1**.

Further, latch **206** may be an example of one implementation for latch **100** in FIG. **1**. Latch **208** may be a different type of latch. Latch **206** is described in greater detail in FIGS. **3-8** below. In particular, portion **210** of sidewall **200** is shown in an enlarged view in FIG. **3**.

With reference now to FIG. **3**, an illustration of an enlarged view of portion **210** of sidewall **200** with latch **206** from FIG. **2** is depicted in accordance with an illustrative embodiment. In FIG. **3**, an enlarged view of portion **210** of sidewall **200**

from FIG. **2** is shown without structural member **205** from FIG. **2** such that latch **206** may be more clearly seen.

In this illustrative example, latch **206** is attached to first panel **202** using first attachment structure **300** and attached to second panel **204** using second attachment structure **302**. First attachment structure **300** and second attachment structure **302** may be examples of implementations for first attachment structure **150** and second attachment structure **152**, respectively, in FIG. **1**.

As depicted, latch **206** includes latch body **304**, second member **306**, and first member **308**. Latch body **304**, second member **306**, and first member **308** may be examples of implementations for latch body **106**, second member **108**, and first member **112**, respectively, in FIG. **1**. In this illustrative example, first attachment structure **300** engages first member **308**, while second attachment structure **302** engages second member **306**.

Turning now to FIG. **4**, an illustration of an isometric view of latch **206** from FIGS. **2-3** is depicted in accordance with an illustrative embodiment. As depicted, latch body **304** includes attachment feature **400** and attachment feature **402**. Attachment feature **400** and/or attachment feature **402** may be used to attach latch body **304** to structural member **205** in FIG. **2**.

Further, first attachment structure **300** includes first hook **404**. Second attachment structure **302** includes second hook **406**. First hook **404** engages first member **308**, while second hook **406** engages second member **306**.

With reference now to FIG. **5**, an illustration of a top cross-sectional view of latch **206** from FIG. **4** is depicted in accordance with an illustrative embodiment. In this illustrative example, a top cross-sectional view of latch **206** is depicted, taken with respect to lines **5-5** in FIG. **4**.

As depicted, latch **206** includes adjustment member **500**. Adjustment member **500** is a cam in this illustrative example. Adjustment member **500** is an example of one implementation for adjustment member **110** in FIG. **1**. Adjustment member **500** is held within retaining area **502** formed by latch body **304**. When adjustment member **500** is held within retaining area **502**, channel **504** is formed. Channel **504** may be an example of one implementation for receiving area **118** in FIG. **1**. Channel **504** extends through latch body **304** and adjustment member **500**. In particular, a portion of channel **504** is formed by one or more holes, openings, or channels in latch body **304**, while another portion of channel **504** is formed by an opening, hole, or channel that extends through adjustment member **500**.

In this illustrative example, adjustment member **500** has inner threads **508** along the opening through adjustment member **500** that forms a portion of channel **504**. Further, first member **308** has outer threads **510**. When first member **308** is inserted through channel **504**, inner threads **508** engage outer threads **510**. With inner threads **508** and outer threads **510** engaged, rotation of adjustment member **500** about axis **511** causes movement of first member **308** in a direction along axis **511**.

As depicted, first member **308** has stop feature **512**. Stop feature **512** may enter control area **514** when first member **308** is inserted into channel **504**. In this illustrative example, control area **514** has open end **516** and closed end **518**. Cap **520** may be used to close open end **516**. Cap **520** may be an example of one implementation for cap **136** in FIG. **1**. When open end **516** is closed by cap **520**, the movement of first member **308** is limited to the movement of stop feature **512** within control area **514**.

In this illustrative example, first hook **404** is depicted engaged with first coupling element **522** of first member **308**. First coupling element **522** of first member **308** is bounded by element **524** and element **526** of first member **308**. Element **524** and element **526** constrain first coupling element **522** such that first coupling element **522** has a width substantially equal to, or just slightly wider than, width **528** of first hook **404**. In this manner, first hook **404** may be constrained by element **524** and element **526**. When engaged with first coupling element **522**, first hook **404** may be constrained such that first hook **404** may be unable to move in a direction along axis **511** independently of first member **308**.

Second hook **406** is depicted engaged with second coupling element **530** of second member **306**. Second coupling element **530** of second member **306** may be wider than width **532** of second hook **406**. In this manner, second hook **406** may be allowed to move in a direction along axis **511** along second coupling element **530** of second member **306** independently of second member **306**. In this manner, when second panel **204** from FIG. **2** is also connected to the first member of another latch, similar to latch **206**, the extra width of second coupling element **530** may allow movement of second panel **204**.

With reference now to FIG. **6**, an illustration of an exploded isometric view of latch **206** is depicted in accordance with an illustrative embodiment. In this illustrative example, the individual components of latch **206** may be more clearly seen. As depicted, latch body **304** may have opening **600** and opening **602** that form a portion of channel **504** from FIG. **5**. Further, adjustment member **500** may have opening **604** that forms a portion of channel **504** from FIG. **5**.

In this illustrative example, cap **520** has opening **606** having shape **608**. Shape **608** may be selected such that first member **308** and stop feature **512** may both pass through opening **606**. Similarly, opening **600** may have shape **609** such that first member **308** and stop feature **512** may pass through opening **600**. Stop feature **512** may pass through opening **600** and enter control area **514** from FIG. **5**.

As depicted, latch **206** may also include locking mechanism **610**. Locking mechanism **610** may be an example of one implementation for locking mechanism **114** in FIG. **1**. Locking mechanism **610** includes pivotable element **612** and fastener **614**. Fastener **614** may be used to attach pivotable element **612** to latch body **304**. The functions of locking mechanism **610** are described in greater detail in FIGS. **7-8** below.

Turning now to FIG. **7**, an illustration of latch **206** having locking mechanism **610** in an unlocked position is depicted in accordance with an illustrative embodiment. In this illustrative example, locking mechanism **610** is unlocked. In particular, pivotable element **612** is in unlocked position **700**. When pivotable element **612** is in unlocked position **700**, pivotable element **612** does not engage or interface with any of plurality of grooves **702** in adjustment member **500**. Consequently, adjustment member **500** may be allowed to rotate about axis **511**.

For example, adjustment member **500** may be rotated in the direction of arrow **704** or the direction of arrow **706** to move first member **308** along axis **511**. In one illustrative example, rotating adjustment member **500** in the direction of arrow **704** may cause movement of first member **308** in the direction of arrow **708**. In this example, rotating adjustment member **500** in the direction of arrow **706** may cause movement of first member **308** in the direction of arrow **710**.

Pivotable element **612** may be rotated in a direction along arrow **710** to move pivotable element **612** between unlocked position **700** and a locked position (not shown). This locked position for pivotable element **612** is depicted in FIG. **8** below.

With reference now to FIG. **8**, an illustration of latch **206** having locking mechanism **610** in a locked position is depicted in accordance with an illustrative embodiment. In this illustrative example, locking mechanism **610** is locked. In particular, pivotable element **612** has been rotated and moved into locked position **800**. In locked position **800**, pivotable element **612** engages, or interfaces with, a groove in plurality of grooves **702** in adjustment member **500**. This type of engagement prevents rotation of adjustment member **500** about axis **511**.

The illustrations of sidewall **200** in FIG. **2** and latch **206** in FIGS. **2-8** are not meant to imply physical or architectural limitations to the manner in which an illustrative embodiment may be implemented. Other components in addition to or in place of the ones illustrated may be used. Some components may be optional.

The different components shown in FIGS. **2-8** may be illustrative examples of how components shown in block form in FIG. **1** can be implemented as physical structures. Additionally, some of the components in FIGS. **2-8** may be combined with components in FIG. **1**, used with components in FIG. **1**, or a combination of the two.

With reference now to FIG. **9**, an illustration of a process for adjusting a latch is depicted in the form of a flowchart in accordance with an illustrative embodiment. The process illustrated in FIG. **9** may be implemented using latch **100** from FIG. **1** and/or latch **206** from FIGS. **2-8**.

The process begins by inserting a first member having a first coupling element at least partially through a receiving area that extends through at least a portion of a latch body of the latch (operation **900**). Thereafter, the first member is moved along an axis through the receiving area such that a distance between the first coupling element and a second coupling element of a second member associated with the latch body changes (operation **902**), with the process terminating thereafter.

In this manner, the latch may be adjusted. The first coupling element and the second coupling element may be used for joining two panels together through the latch. Changing the distance between these two coupling elements may change a width of the gap between the two panels.

With reference now to FIG. **10**, an illustration of a process for attaching panels to each other using a latch is depicted in the form of a flowchart in accordance with an illustrative embodiment. The process illustrated in FIG. **10** may be implemented using latch **100** from FIG. **1** and/or latch **206** from FIGS. **2-8**.

The process begins by inserting a first member having a first coupling element at least partially through a receiving area that extends through at least a portion of a latch body of a latch (operation **1000**). Next, a first panel is attached to the latch by engaging the first coupling element of the first member with a first attachment structure associated with a first panel (operation **1002**). Further, a second panel is attached to the latch by engaging a second coupling element of a second member associated with the latch body with a second attachment structure associated with the second panel (operation **1004**). In this manner, the first panel and the second panel may be joined together using the latch.

Thereafter, a determination may be made as to whether a width of a gap formed between the first panel and the second panel needs to be changed (operation **1006**). If the width of the gap does not need to be changed, an adjustment member that forms a portion of the receiving area through which the first member has been inserted is locked in place using a locking mechanism (operation **1008**), with the process terminating thereafter.

If the width of the gap does need to be changed, the adjustment member is rotated relative to the first member to move the first member along an axis through the receiving area such that a distance between the first coupling element of the first member and the second coupling element of the second member changes, which in turn, changes the width of the gap formed between the first panel and the second panel (operation **1010**). The process then proceeds to operation **1008** as described above.

Illustrative embodiments of the disclosure may be described in the context of aircraft manufacturing and service method **1100** as shown in FIG. **11** and aircraft **1200** as shown in FIG. **12**. Turning first to FIG. **11**, an illustration of an aircraft manufacturing and service method in the form of a block diagram is depicted in accordance with an illustrative embodiment. During pre-production, aircraft manufacturing and service method **1100** may include specification and design **1102** of aircraft **1200** in FIG. **12** and material procurement **1104**.

During production, component and subassembly manufacturing **1106** and system integration **1108** of aircraft **1200** in FIG. **12** takes place. Thereafter, aircraft **1200** in FIG. **12** may go through certification and delivery **1110** in order to be placed in service **1112**. While in service **1112** by a customer, aircraft **1200** in FIG. **12** is scheduled for routine maintenance and service **1114**, which may include modification, reconfiguration, refurbishment, and other maintenance or service.

Each of the processes of aircraft manufacturing and service method **1100** may be performed or carried out by a system integrator, a third party, and/or an operator. In these examples, the operator may be a customer. For the purposes of this description, a system integrator may include, without limitation, any number of aircraft manufacturers and major-system subcontractors; a third party may include, without limitation, any number of vendors, subcontractors, and suppliers; and an operator may be an airline, a leasing company, a military entity, a service organization, and so on.

With reference now to FIG. **12**, an illustration of an aircraft in the form of a block diagram is depicted in which an illustrative embodiment may be implemented. In this example, aircraft **1200** is produced by aircraft manufacturing and service method **1100** in FIG. **11** and may include airframe **1202** with plurality of systems **1204** and interior **1206**. Examples of systems **1204** include one or more of propulsion system **1208**, electrical system **1210**, hydraulic system **1212**, and environmental system **1214**. Any number of other systems may be included. Although an aerospace example is shown, different illustrative embodiments may be applied to other industries, such as the automotive industry.

Apparatuses and methods embodied herein may be employed during at least one of the stages of aircraft manufacturing and service method **1100** in FIG. **11**. For example, latches implemented in a manner similar to latch **100** from FIG. **1** and/or latch **206** from FIGS. **2-8** may be used to install the sidewall for interior **1206** of aircraft **1200**. These latches may be used during component and subassembly manufacturing **1106**, system integration **1108**, and/or maintenance and service **1114**. Further, the different components that make up these latches may be manufactured and/or assembled during at least one of material procurement **1104** and component and subassembly manufacturing **1106**.

Using a latch similar to latch **100** from FIG. **1** and/or latch **206** from FIGS. **2-8** may reduce the overall time needed for installing the sidewall for the interior of aircraft **1200**. Further, using these types of latches may be easier than using loose fasteners, screw guns, and/or other types of tools for installation, adjustment, and/or removal of panels for the

sidewall. Still further, using these types of latches that allow the width of the gaps between the panels to be adjusted may increase the efficiency with which the sidewall may be installed.

In one illustrative example, components or subassemblies produced in component and subassembly manufacturing **1106** in FIG. **11** may be fabricated or manufactured in a manner similar to components or subassemblies produced while aircraft **1200** is in service **1112** in FIG. **11**. As yet another example, one or more apparatus embodiments, method embodiments, or a combination thereof may be utilized during production stages, such as component and subassembly manufacturing **1106** and system integration **1108** in FIG. **11**. One or more apparatus embodiments, method embodiments, or a combination thereof may be utilized while aircraft **1200** is in service **1112** and/or during maintenance and service **1114** in FIG. **11**. The use of a number of the different illustrative embodiments may substantially expedite the assembly of and/or reduce the cost of aircraft **1200**.

In this manner, the illustrative embodiments provide a method and apparatus adjusting a latch. The latch may comprise a latch body, a first member, and second member associated with the latch body. A receiving area extends through at least a portion of the latch body. The first member is configured to be at least partially received within the receiving area. The first member has a first coupling element. The second member has a second coupling element. Movement of the first member along an axis through the receiving changes a distance between the first coupling element and the second coupling element. In this manner, the latch may be adjusted by changing the distance between the first coupling element and the second coupling element. Making this adjustment may change the width of the gap formed between any two objects joined together using the latch.

The description of the different illustrative embodiments has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the embodiments in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. Further, different illustrative embodiments may provide different features as compared to other illustrative embodiments. The embodiment or embodiments selected are chosen and described in order to best explain the principles of the embodiments, the practical application, and to enable others of ordinary skill in the art to understand the disclosure for various embodiments with various modifications as are suited to the particular use contemplated.

What is claimed is:

1. An apparatus comprising:

a latch body, wherein a receiving area extends through at least a portion of the latch body;

a first member configured to be at least partially received within the receiving area of the latch body, wherein the first member has a first coupling element;

a second member associated with the latch body, wherein the second member has a second coupling element and wherein movement of the first member along an axis through the receiving area changes a distance between the first coupling element and the second coupling element;

a third member associated with the latch body, wherein the third member has a third coupling element;

an adjustment member wherein relative rotation between the adjustment member and the first member causes the first member to move along the axis; and

a pivotable element, wherein the pivotable element is movable independent of the adjustment member and wherein rotation of the pivotable element into a locked position locks the adjustment member in place to prevent the relative rotation between the adjustment member and the first member and wherein rotation of the pivotable element into an unlocked position unlocks the adjustment member to allow the relative rotation between the adjustment member and the first member.

2. The apparatus of claim **1** wherein the first and second coupling elements are cylindrical.

3. The apparatus of claim **1**, wherein the wherein the second coupling element is configured to allow the second attachment structure to move along the axis.

4. The apparatus of claim **1**, wherein the third coupling element is configured to be connected to a structural member of an aerospace vehicle.

5. The apparatus of claim **4**, wherein the first coupling element is configured to be connected to a first panel and the second coupling element is configured to be connected to a second panel.

6. The apparatus of claim **1**, wherein the adjustment member comprises:

a plurality of grooves, wherein the pivotable element is configured to enter a groove in the plurality of grooves when the pivotable element is in the locked position.

7. The apparatus of claim **1**, wherein the first member comprises:

a protrusion configured to enter an open end of a control area within the latch body when the first member enters the receiving area within the latch body, wherein the control area is a slot and has a closed end.

8. The apparatus of claim **7** further comprising:

a cap configured for association with the latch body, wherein the cap is used to close the open end of the control area with the protrusion of the first member located within the control area such that a distance by which the first member can be moved along the axis is determined by a length of the control area.

9. The apparatus of claim **1**, wherein the first coupling element is a first elongated portion of the first member configured to receive a first hook and the second coupling element is a second elongated portion of the second member configured to receive a second hook.

10. The apparatus of claim **1**, wherein a first attachment structure is configured to engage the first coupling element of the first member and a second attachment structure is configured to engage the second coupling element of the second member.

11. The apparatus of claim **10**, wherein the first attachment structure comprises a first hook configured to engage the first coupling element of the first member and the second attachment structure comprises a second hook configured to engage the second coupling element of the second member.

12. The apparatus of claim **10**, wherein the first attachment structure is associated with a first panel and wherein the second attachment structure is associated with a second panel.

13. The apparatus of claim **10**, the second coupling element is configured to allow the second attachment structure to move along the axis.

14. The apparatus of claim **12**, wherein the first panel and the second panel are configured for use in forming a sidewall for an interior of an aircraft.

15. The apparatus of claim **12**, wherein moving the first member along the axis through the receiving area such that a distance between the first coupling element and the second coupling element changes a width of a gap between the first panel and the second panel.

16. The apparatus of claim 12, wherein the latch body is configured for attachment to a structural member such that the first panel and the second panel are associated with the structural member.

17. A method for using a latch, the method comprising:

inserting a first member having a first coupling element at least partially through a receiving area that extends through at least a portion of a latch body of the latch, wherein the latch comprises a second member associated with the latch body having a second coupling element and a third member associated with the latch body having a third coupling element;

moving the first member along an axis through the receiving area such that a distance between the first coupling element and the second coupling element associated with the latch body changes;

rotating the first member relative to an adjustment member that forms a portion of the receiving area to move the first member along the axis through the receiving area such that the distance between the first coupling element and the second coupling element of the second member associated with the latch body changes; and

pivoting a pivotable element, wherein the pivotable element is movable independent of the adjustment member and wherein rotation of the pivotable element into a locked position locks the adjustment member in place to prevent the relative rotation between the adjustment member and the first member and wherein rotation of the pivotable element into an unlocked position unlocks the adjustment member to allow the relative rotation between the adjustment member and the first member.

18. The method of claim 17 further comprising:

engaging the first coupling element of the first member with a first attachment structure associated with a first panel; and

engaging the second coupling element of the second member with a second attachment structure associated with a second panel.

19. The method of claim 18, wherein moving the first member along the axis through the receiving area comprises:

moving the first member along the axis through the receiving area to change the distance between the first coupling element and the second coupling element such that a width of a gap between the first panel and the second panel changes.

20. The method of claim 19, further comprising:

attaching the third coupling element to a structural member of an aircraft.

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